

Claims

1. A method of forming a droplet of weld metal on a welding wire electrode and separating the droplet from the electrode in an arc welding process, said method comprising:

establishing a direct current flow in an arc between said electrode and a workpiece at a background current flow level over a welding cycle time period for forming a droplet on said electrode and transferring said droplet in said arc to said workpiece;

producing a first pulse in said current flow, during said welding cycle time period, at a first pulsed current flow level greater than said background current flow level for forming said droplet on said electrode; and

producing a second pulse in said current flow, during said welding cycle time period, at a second pulsed current flow level greater than said first pulsed current flow level for separating said droplet from said electrode and for transfer in said arc to said workpiece.

2. A method as recited in claim 1 in which said current is continued at said background flow level and said first and second current flow pulses are repeated to form and transfer a corresponding plurality of droplets of weld material from said electrode to said workpiece to form a weld in said workpiece.

3. A method as recited in claim 1 in which the duration of said first pulse in said current flow is a first pulse period that is less than half of said welding cycle time period.

4. A method as recited in claim 3 in which the duration of said second pulse in said current flow is a second pulse period that is less than said first pulse period.

5. A method as recited in claim 1 which is conducted in a gas metal arc welding process and in which said droplet is transferred in a globular mode.

6. A method as recited in claim 2 which is conducted in a gas metal arc welding process and in which said droplet is transferred in a globular mode.

7. A method as recited in claim 3 which is conducted in a gas metal arc welding process and in which said droplet is transferred in a globular mode.

8. A method as recited in claim 4 which is conducted in a gas metal arc welding process and in which said droplet is transferred in a globular mode.

9. A method of forming a droplet of weld metal on a welding wire electrode and separating the droplet from the electrode in a gas metal arc welding process, said method comprising:

establishing a direct current flow in an arc between said electrode and a workpiece at a background current flow level over a welding cycle time period for forming a droplet on said electrode and transferring said droplet in said arc to said workpiece;

producing a first pulse in said current flow, during said welding cycle time period, at a first pulsed current flow level greater than said background current flow level for forming said droplet on said electrode; and

producing a second pulse in said current flow, during said welding cycle time period, at a second pulsed current flow level greater than said first pulsed current flow level for separating said droplet from said electrode and for transfer in said arc in a globular mode to said workpiece.

10. A method as recited in claim 9 in which said current is continued at said background flow level and said first and second current flow pulses are repeated to form and transfer a corresponding plurality of droplets of weld material from said electrode to said workpiece to form a weld in said workpiece.

11. A method as recited in claim 9 in which the duration of said first pulse in said current flow is a first pulse period that is less than half of said welding cycle time period.

12. A method as recited in claim 11 in which the duration of said second pulse in said current flow is a second pulse period that is less than said first pulse period.